SUMMARY OF MAJOR ISSUES AND FINDINGS IN THE TRINITY RIVER BASIN

Nutrients in streams (p. 6–7)

Nutrients in tributary streams rarely are at concentrations unacceptable for drinking water.

- Total nitrogen concentrations are similar in urban and agricultural streams and are larger in urban and agricultural streams than in streams in rangeland and forest areas.
- The only samples with nitrate concentrations greater than the U.S. Environmental Protection Agency (EPA) drinking-water standard are from Calloway Branch (an urban stream) and the Trinity River downstream from Dallas (affected by point sources).
- Total phosphorus concentrations are similar in all tributaries, regardless of land use.
- Nutrient concentrations in streams vary seasonally and are as much as 100 percent greater during the spring than during the winter.

Pesticides in streams (p. 8–9)

Pesticides are in most streams. Much of the streamflow is captured by reservoirs, which are sources of drinking water.

- Four to six herbicides commonly were detected in streams draining urban and agricultural areas. Atrazine was detected in samples from all streams draining urban and agricultural areas. Atrazine concentrations in agricultural streams often exceed the drinking-water standard during the spring when atrazine is applied to fields and rains producing runoff are most common.
- Two to four insecticides commonly were detected in streams draining urban areas, and usually no more than one insecticide was detected in streams draining agricultural areas. Diazinon is in all samples from streams draining urban areas. Diazinon concentrations in urban streams exceed the EPA health advisory level for drinking water in 15 percent of samples.

Determining water-quality trends using sediment cores (p. 10–11)

Lead, DDT, and polychlorinated biphenyl (PCB) concentrations have decreased, but chlordane, polycyclic aromatic hydrocarbon (PAH), and zinc concentrations have increased in sediments from urban streams since the mid-1960s.

- Environmental trends in contaminants tend to follow historical use. For example, lead concentrations in a White Rock Lake sediment core peaked in the 1970s at about 5 times background concentrations and decreased since the introduction of unleaded gasoline to about 2 times background concentrations by the early 1990s.
- DDT and PCB concentrations have decreased about 90 percent in the White Rock Lake core since their use was banned in the 1970s.
- Chlordane concentrations increased in response to urban growth and increasing use of chlordane during the 1970s and 1980s and peaked soon after use was banned in the late 1980s.
- PAH concentrations in the White Rock Lake sediment core are 20 times greater in recent sediments than in pre-urbanization sediments, and zinc concentrations have increased about 60 percent. Both probably result largely from automobile use in the watershed.

Organochlorines in streambed sediments and aquatic biota (p. 12–13)

Concentrations of some toxic compounds in sediments commonly exceed Texas Natural Resource Conservation Commission screening concentrations.

- Concentrations of chlordane, dieldrin, and the DDT environmental degradation products, DDD and DDE, in bed sediment are larger in streams draining urban areas than in streams draining agricultural areas and exceed Texas Natural Resource Conservation Commission screening concentrations for these compounds in sediment.
- Chlordane, DDT, and PCBs are more commonly detected in fish in streams draining urban areas than agricultural areas.

Stream-habitat characteristics and fish-community degradation (p. 14–16)

Fish communities are affected by characteristics of streamflow and the structure of physical habitats in the stream channel, in addition to water chemistry. In streams where historical patterns of streamflow have been altered by channelization, degradation in the fish community has occurred.

- Streams in developed urban and agricultural settings generally have more variable streamflow, more degraded and less diverse physical habitats, and more degraded fish communities than comparable streams in less-developed settings.
- The urban stream West Fork Trinity River in Fort Worth has highly variable streamflow, is channelized with little or no meandering, has few woody snags in the stream, and has low woody-species diversity in the riparian zone. As a result, more nonnative and generally more pollutant-tolerant species of fish are in this stream than in comparable natural streams.
- The Blackland Prairie stream Chambers Creek is channelized and leveed in its lower reach, which has reduced the structural complexity of physical habitat. A high percentage of tolerant fish species are present in this reach of Chambers Creek.

Use of a new method, semipermeable membrane device (SPMD), to assess the occurrence of water-borne PAHs in streams (p. 17–18)

The SPMD is an effective tool to detect trace organic compounds in water. The small concentrations of many compounds in streams might not be detected by more traditional water-sampling techniques.

- Twenty-five PAHs were detected in SPMDs deployed in urban streams in the Dallas-Fort Worth metropolitan area.
- Nine of the PAHs detected by the SPMDs are on the Public Health Service Agency for Toxic Substances and Disease Registry priority list of 275 hazardous substances, and two, benzo(*a*)pyrene and benzo(*b*)fluoranthene, are ranked in the top 10.

Fish-community changes reflect water-quality improvements (p. 19–21)

Improvements in the treatment of wastewater in the Dallas-Fort Worth area from the early 1970s through the mid-1990s have been beneficial to the water quality of the Trinity River.

- Ammonia plus organic nitrogen concentrations in the Trinity River downstream from Dallas have decreased about 95 percent from more than 10 milligrams per liter in the 1970s to near trace concentrations in the mid-1990s.
- Dissolved oxygen conditions in the Trinity River downstream from Dallas have improved vastly from the 1970s, when occurrences of nearly no dissolved oxygen were common, to the mid-1990s, when concentrations were almost never less than 5 milligrams per liter.
- The fish community has improved markedly since the mid-1980s when several fishkills occurred. Now (1998), many native species of fish that were absent in the 1970s have returned to the Trinity River downstream from Dallas.

Quality of ground water in aquifer outcrops (p. 22–23)

Pesticide, volatile organic compound (VOC), and elevated nutrient concentrations were present in some shallow (outcrop) water wells in urban and agricultural areas; however, most samples did not exceed drinking-water standards.

- About 10 to 30 percent of samples from the shallow zone (outcrop) of each of four aquifers contained herbicides, and about 5 to 50 percent contained insecticides. None of the pesticide concentrations in samples of shallow ground water exceeded drinking-water standards or health advisory levels. Thirteen percent of nitrate concentrations in the shallow zone of the Woodbine aquifer exceeded the EPA standard for drinking water.
- VOCs were detected in one or more samples from each of the four aquifers sampled. The most commonly detected VOC was MTBE, a gasoline additive, in the urban part of the Woodbine aquifer.
- None of the samples from the Trinity aquifer exceeded EPA maximum contaminant levels for drinking water; however, the insecticide diazinon was detected in nearly one-half the samples.